

Oil and natural gas: market outlook and drivers



for

2016 Intellectual Capital Conference

May 25, 2016 | Baltimore, MD

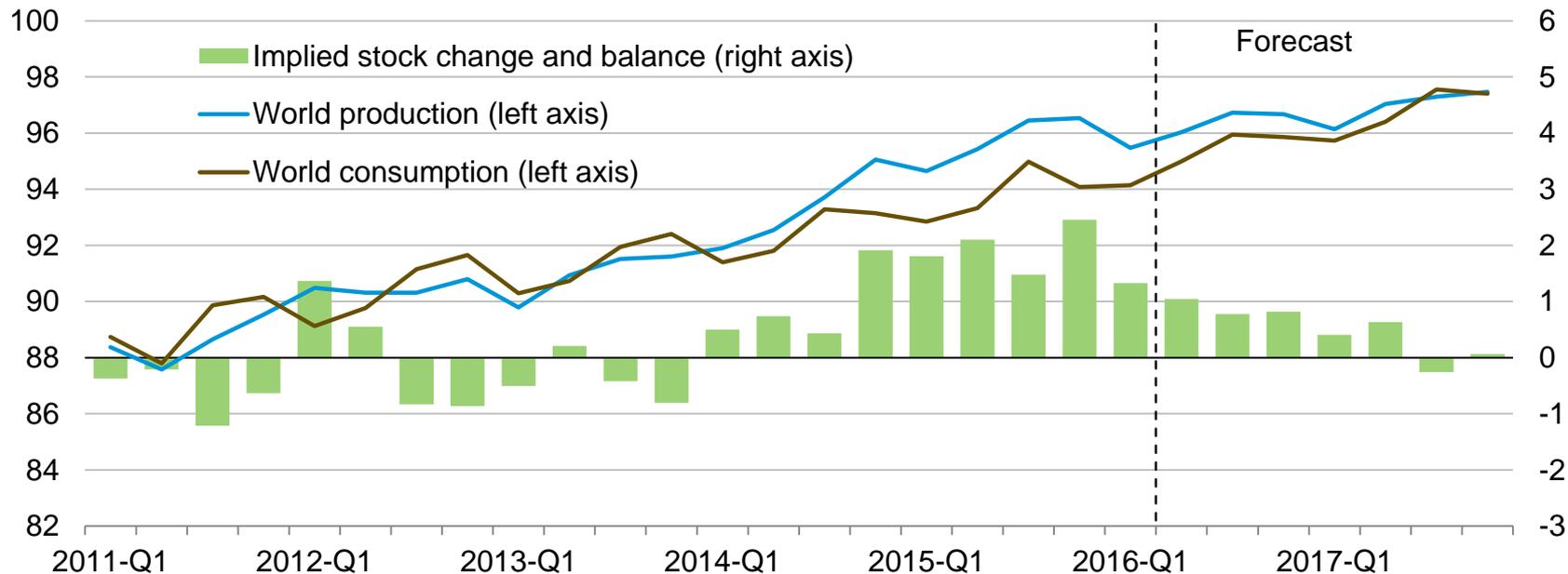
by

Howard Gruenspecht, Deputy Administrator

Global supply has consistently exceeded demand since the start of 2014; EIA forecasts a return to market balance in the second half of 2017

world supply and demand
million barrels per day

implied stock change
million barrels per day

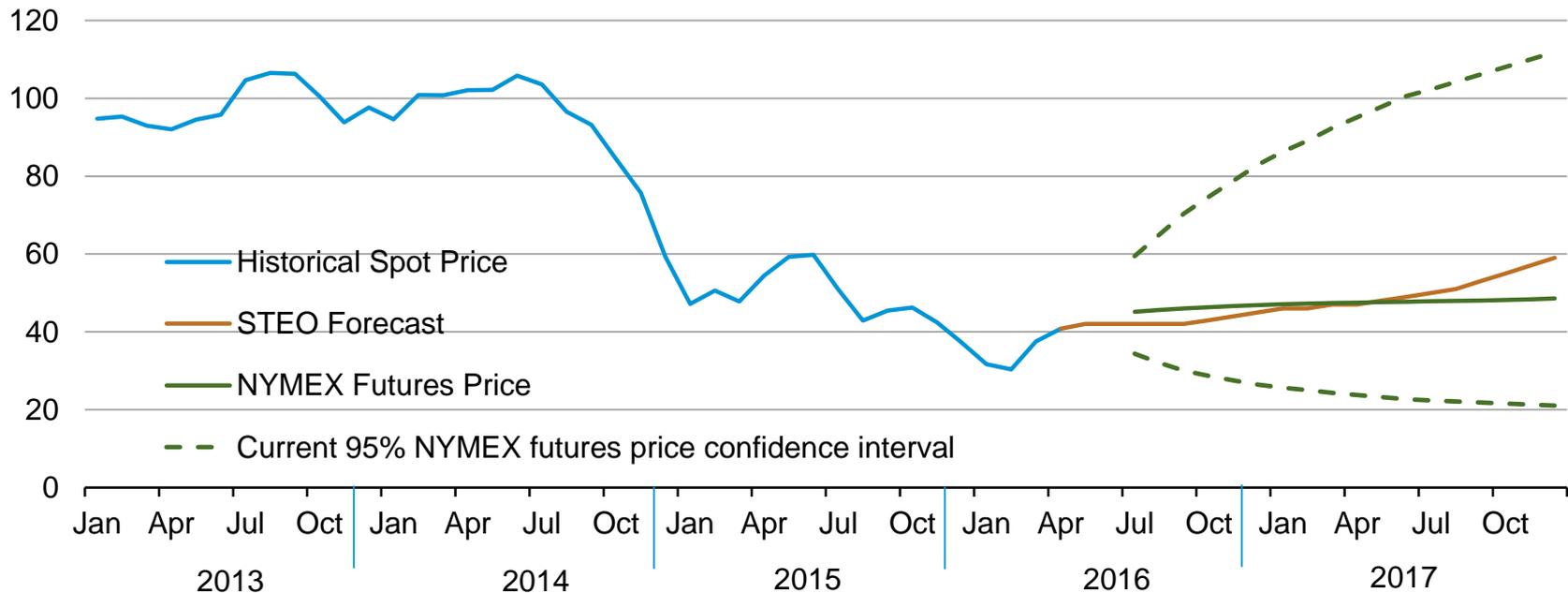


Source: EIA, Short-Term Energy Outlook, May 2016

EIA expects WTI oil prices to remain low compared to recent history, but the market-implied confidence band is very wide

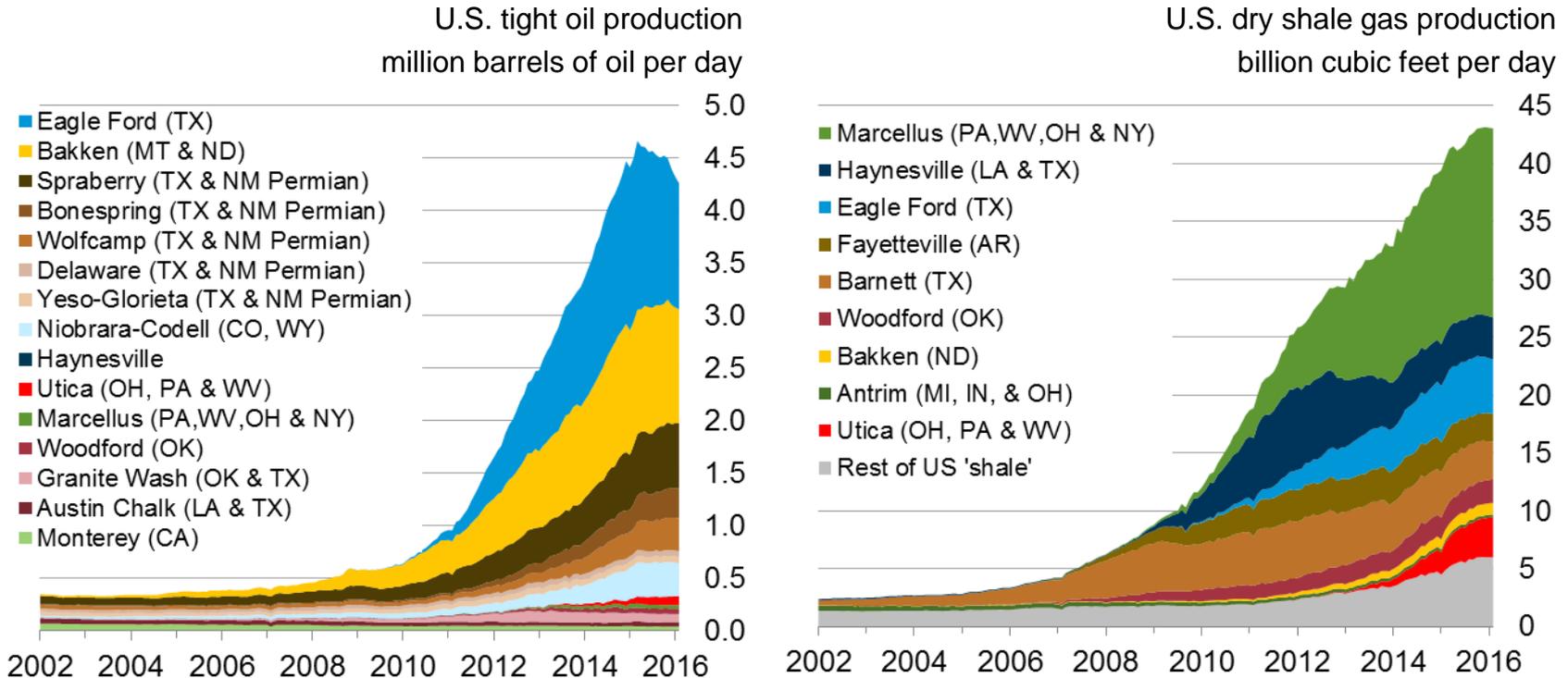
WTI price

dollars per barrel



Source: EIA, Short-Term Energy Outlook, May 2016

The U.S. has experienced a rapid increase in natural gas and oil production from shale and other tight resources

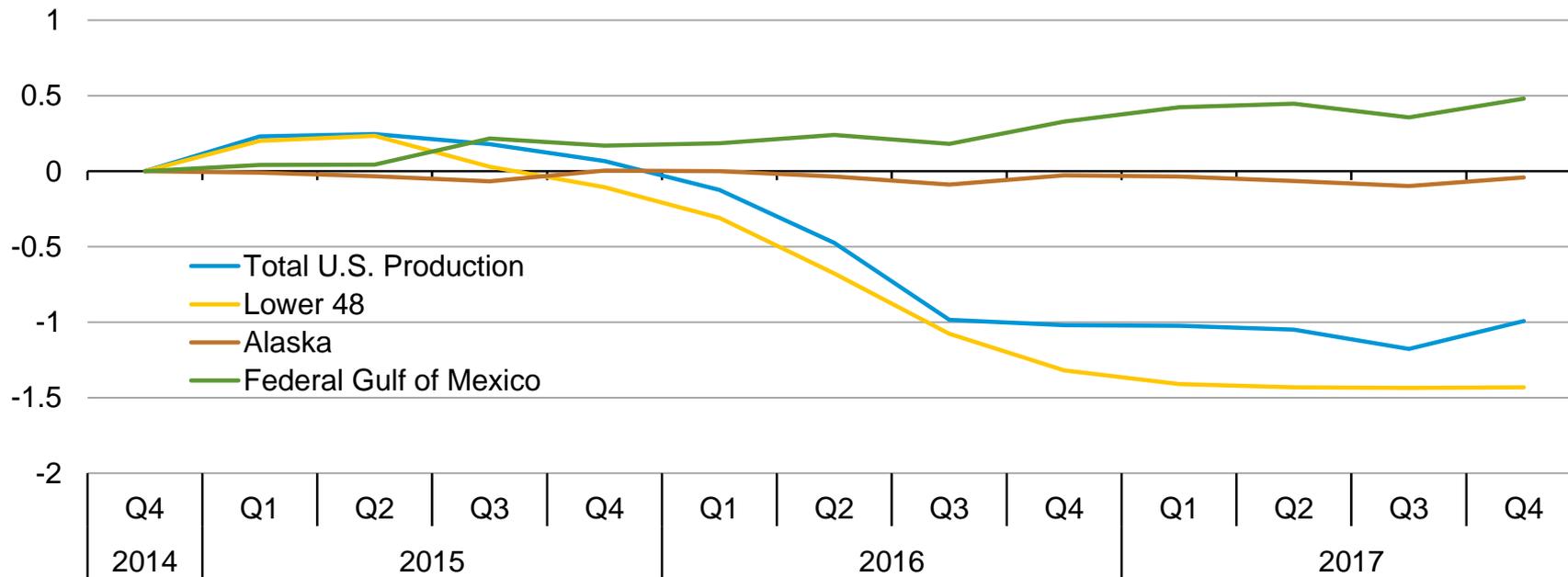


Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through February 2016 and represent EIA's official tight oil & shale gas estimates, but are not survey data. State abbreviations indicate primary state(s).

Long lead times and past investment are contributing to growth from the Gulf of Mexico as Lower 48 production declines

U.S. crude oil production growth by area

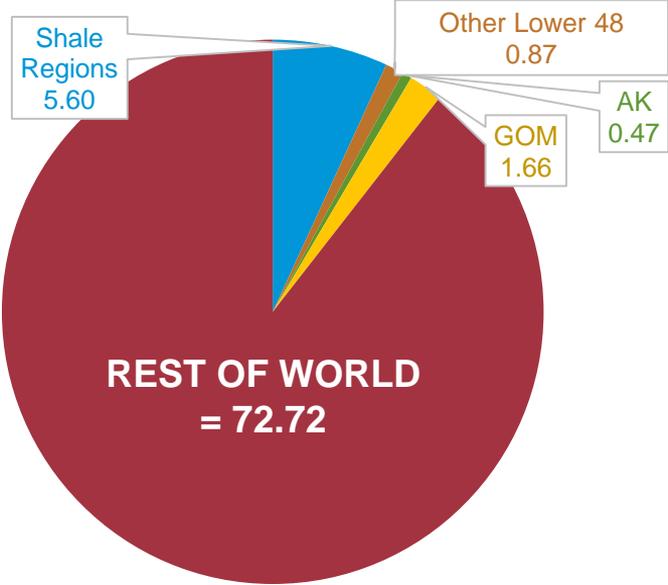
change from fourth quarter, 2014 (million barrels per day)



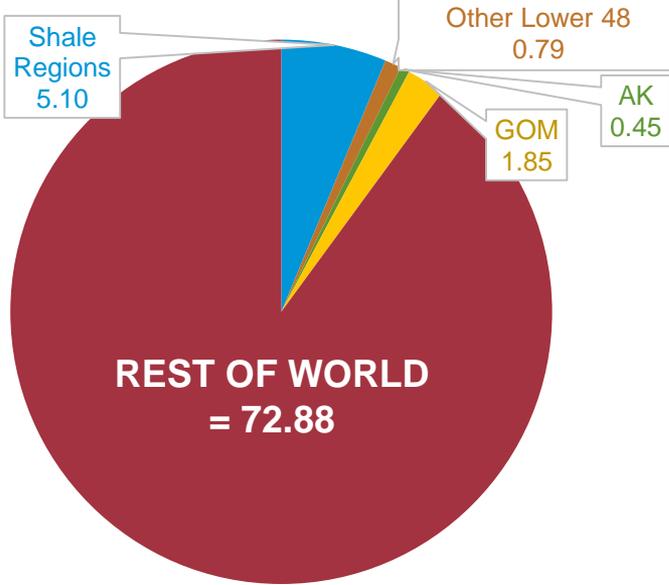
Source: EIA, Short-Term Energy Outlook, May 2016

Crude supply trends outside the United States (red areas below) are key to future oil market balance: geopolitical developments, exporter decisions, and the timing and magnitude of supply effects stemming from reduced investment all matter

2016 oil production, million barrels per day



2017 oil production, million barrels per day

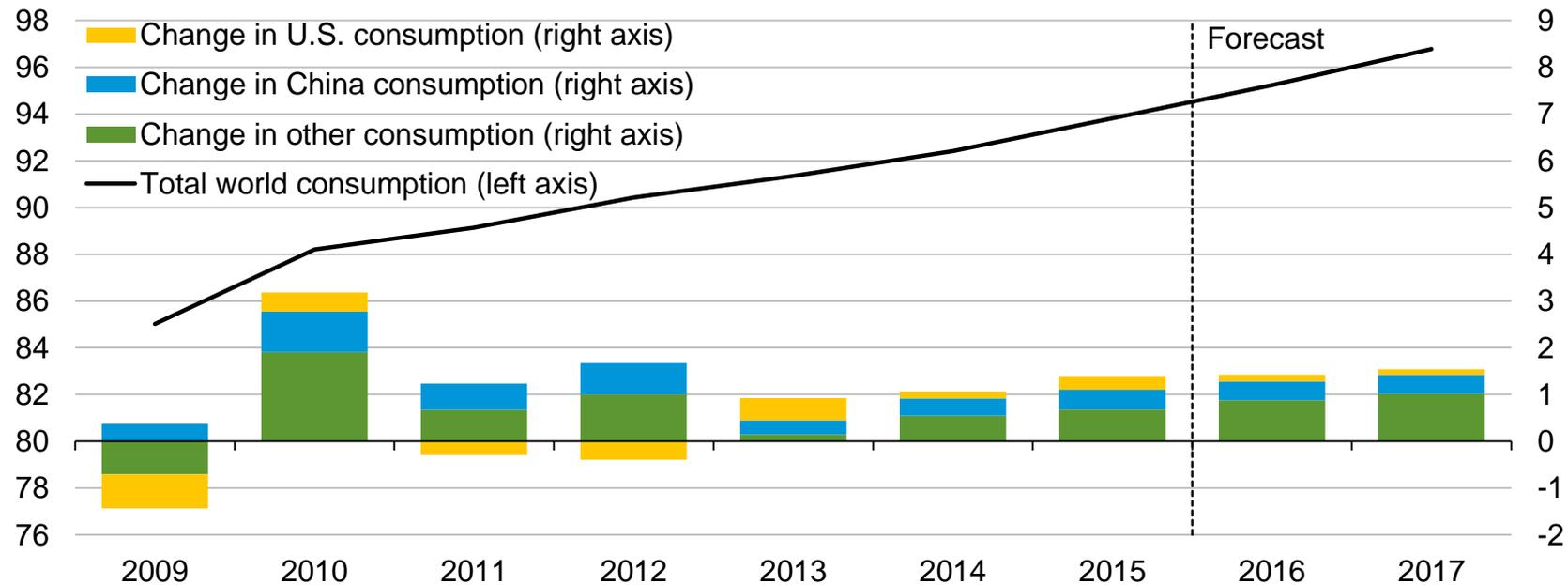


Source: EIA, Short-Term Energy Outlook and Drilling Productivity Report, May 2016; International Energy Agency

EIA forecasts global liquids consumption growth at 1.4 million b/d in 2016 and 1.5 million b/d in 2017

world liquid fuels consumption
million barrels per day

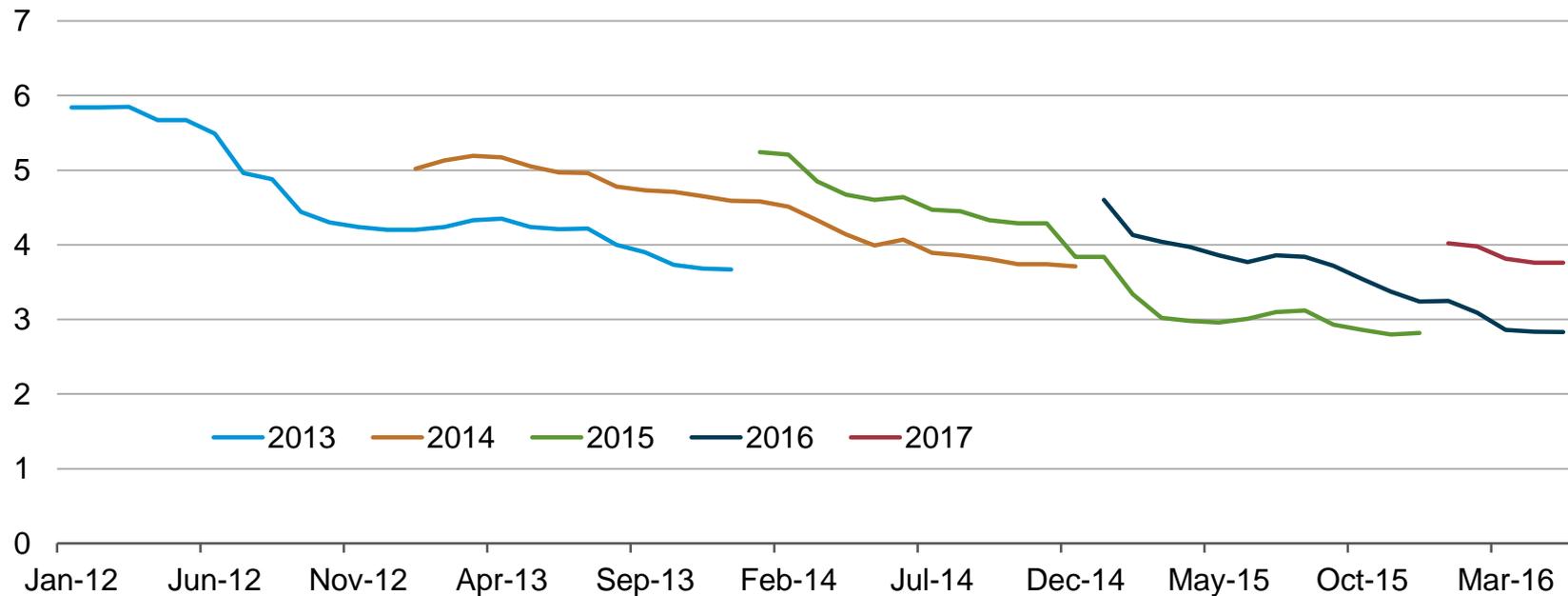
annual change
million barrels per day



Source: EIA, Short-Term Energy Outlook, May 2016

Non-OECD economic growth projections, a key driver of oil demand, have been reduced over the course of recent STEO forecasts

GDP growth in non-OECD countries
annual expectations by date of forecast

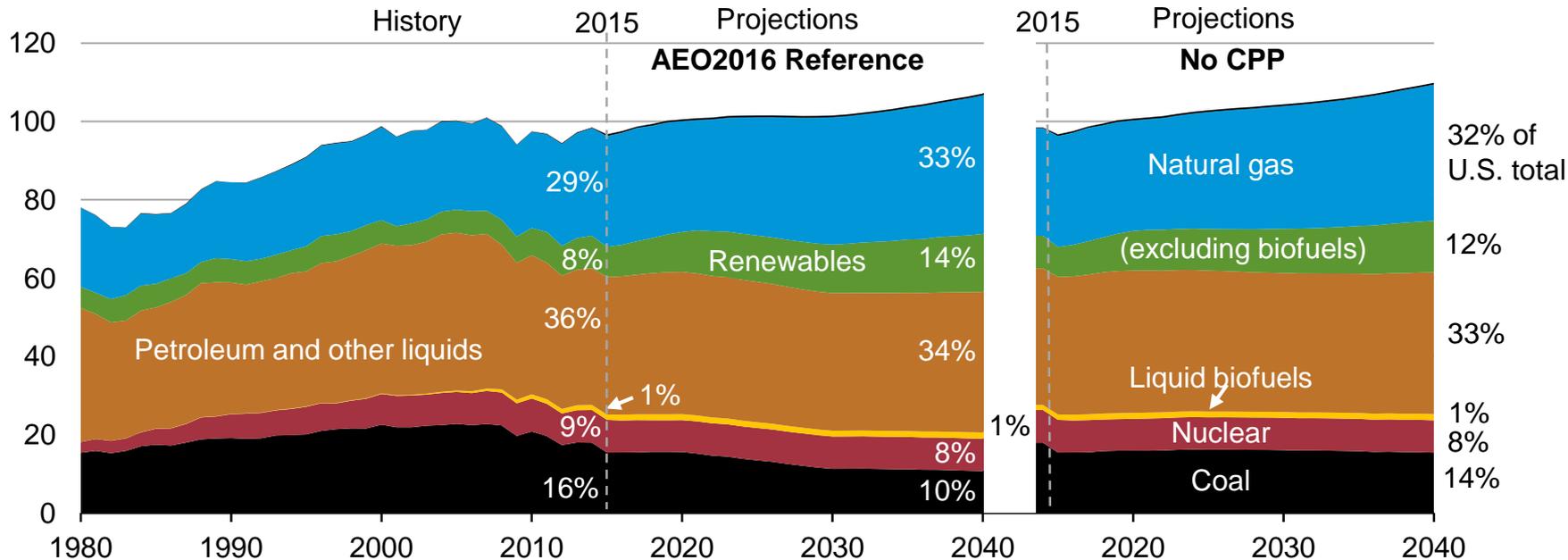


Source: EIA, Short-Term Energy Outlook, May 2016

U.S. Outlook

Reductions in energy intensity largely offset effects of economic and population growth, leading to slow projected growth in energy use

U.S. primary energy consumption
quadrillion Btu

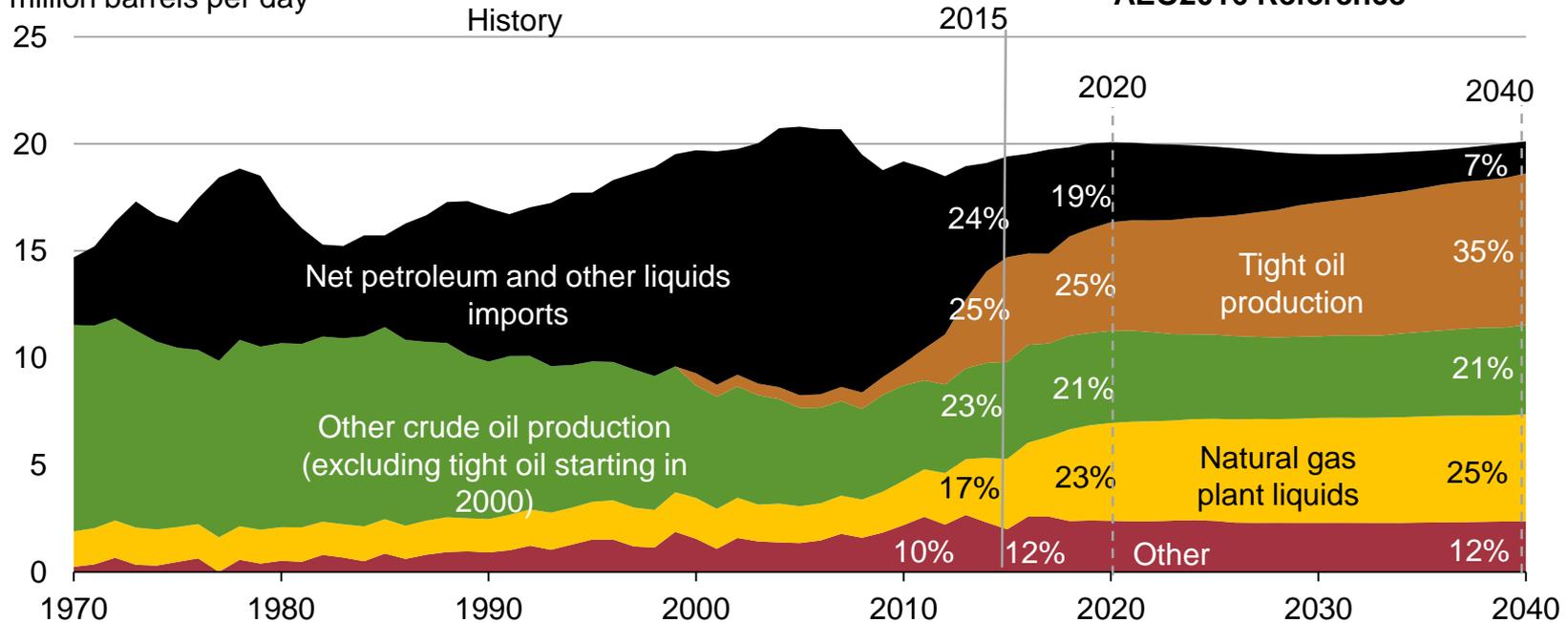


Source: EIA, Annual Energy Outlook 2016

Combination of increased tight oil production and higher fuel efficiency drives projected decline in oil imports

U.S. liquid fuels supply

million barrels per day



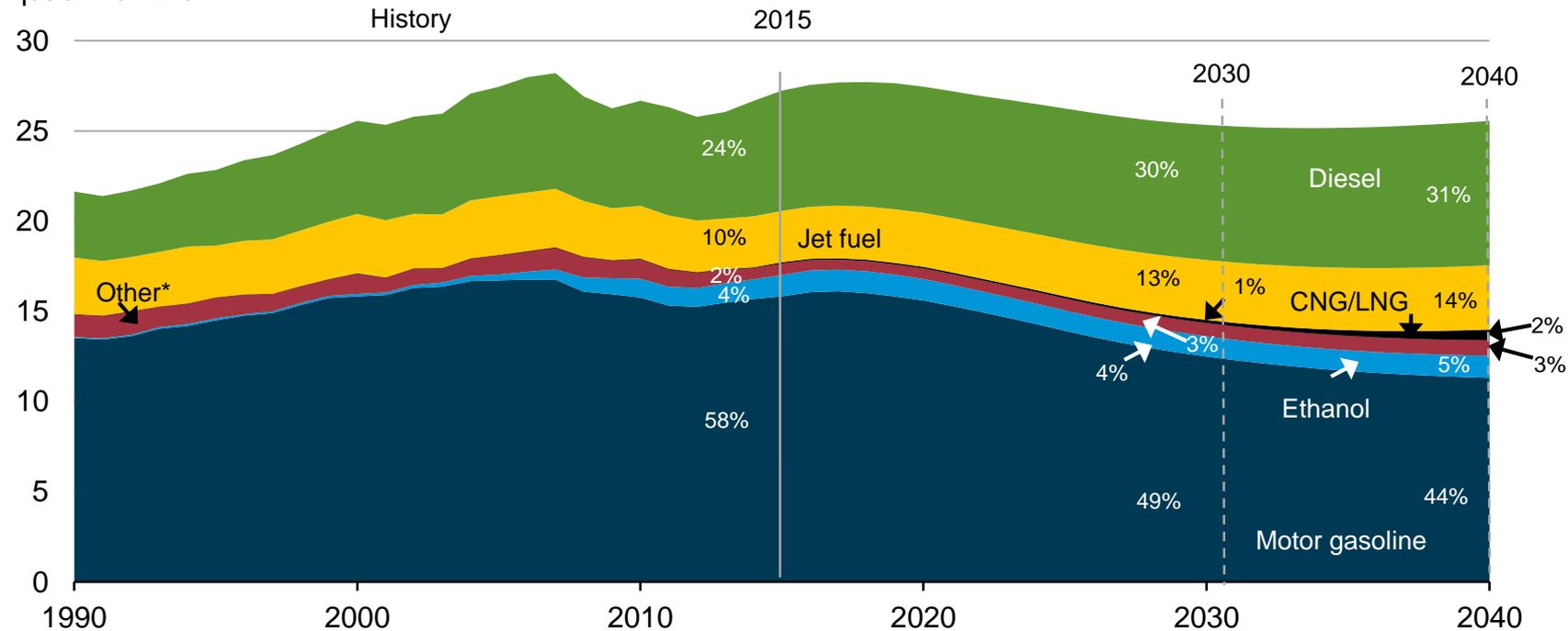
Note: "Other" includes refinery gain, biofuels production, all stock withdrawals, and other domestic sources of liquid fuels

Source: EIA, Annual Energy Outlook 2016

In the transportation sector, motor gasoline use declines; diesel fuel, jet fuel, and natural gas use all grow

transportation energy consumption by fuel

quadrillion Btu



Source: EIA, Annual Energy Outlook 2016

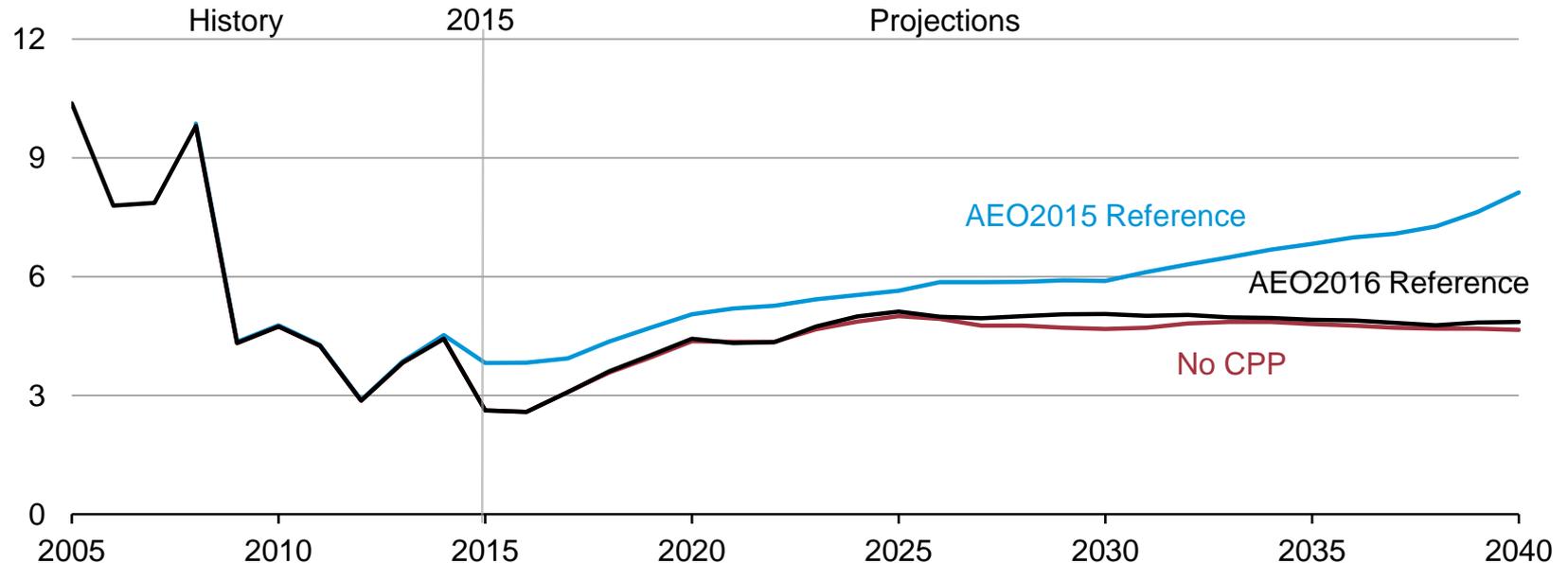
*Includes aviation gasoline, propane, residual fuel oil, lubricants, electricity, and liquid hydrogen

Takeaways – Natural gas

- North American natural gas production is more likely to be limited by demand than supply
- U.S. natural gas demand growth is likely to be concentrated in electricity and industrial uses; natural gas exports and use in the transportation sector, where little natural gas is used today, are also likely to grow
- Potential challenges to natural gas demand growth include
 - Slow growth in U.S. electricity demand
 - Competition from offshore “stranded” gas for global LNG exports and siting of gas-intensive industries.
 - Long-term cheap oil would be another significant challenge to LNG exports
 - Extent and nature of global price convergence in natural gas markets
- Future policies that target particular sources or uses of energy or energy-related emissions can really matter for future natural gas demand

Natural gas prices are projected to remain below \$5 per million British thermal units through most of the projection period with or without the Clean Power Plan

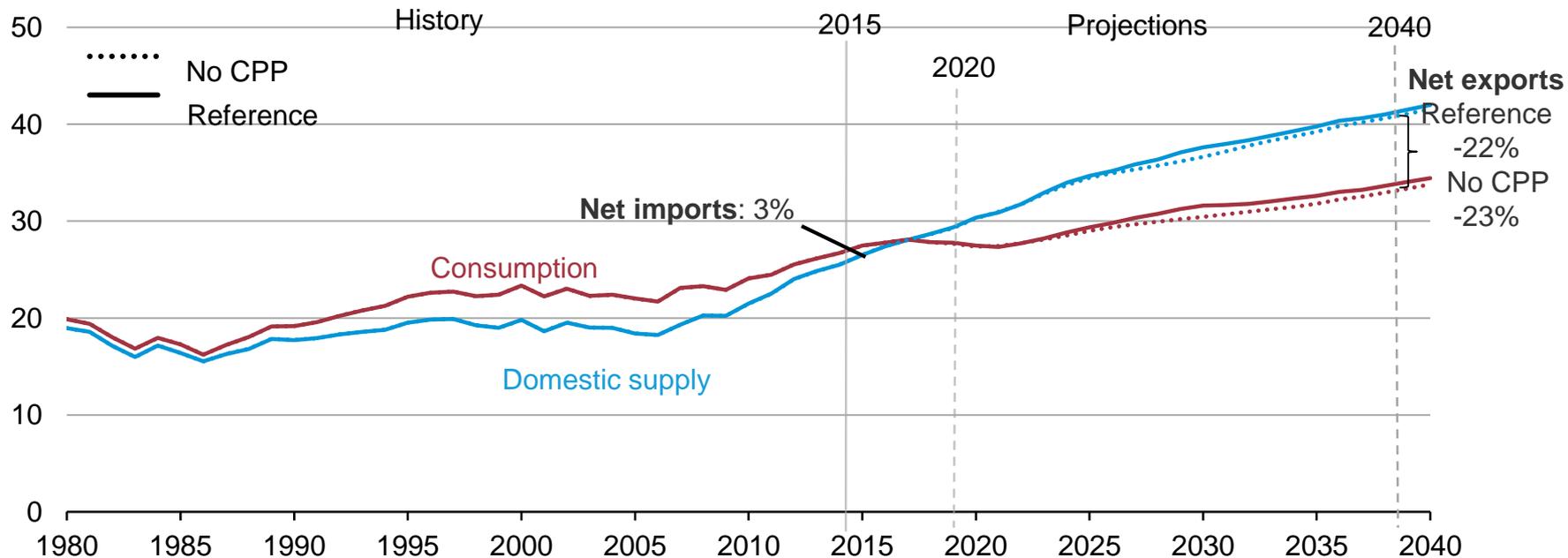
average Henry Hub spot prices for natural gas
2015 dollars per million Btu



Source: EIA, Annual Energy Outlook 2016

U.S. natural gas production exceeds consumption, making the United States a net exporter of natural gas in the very near future

U.S. energy production and consumption
quadrillion Btu

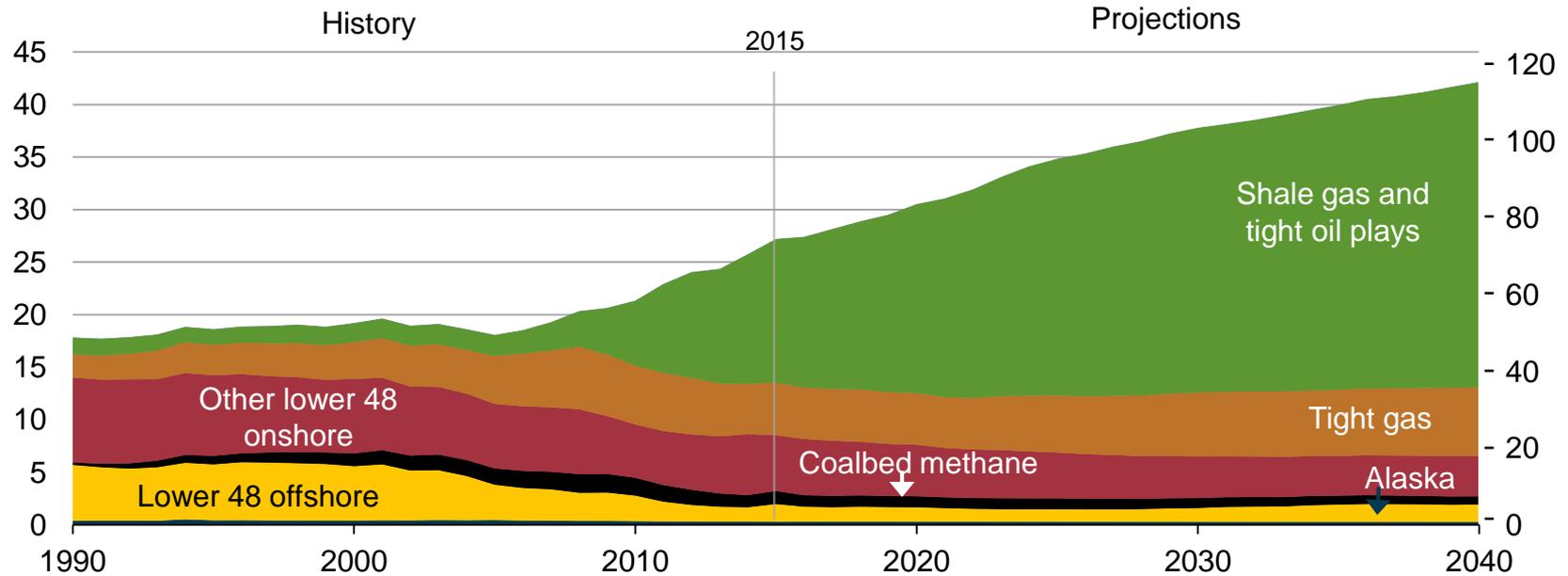


Source: EIA, Annual Energy Outlook 2016

Shale resources remain the dominant source of U.S. natural gas production growth

U.S. dry natural gas production
trillion cubic feet

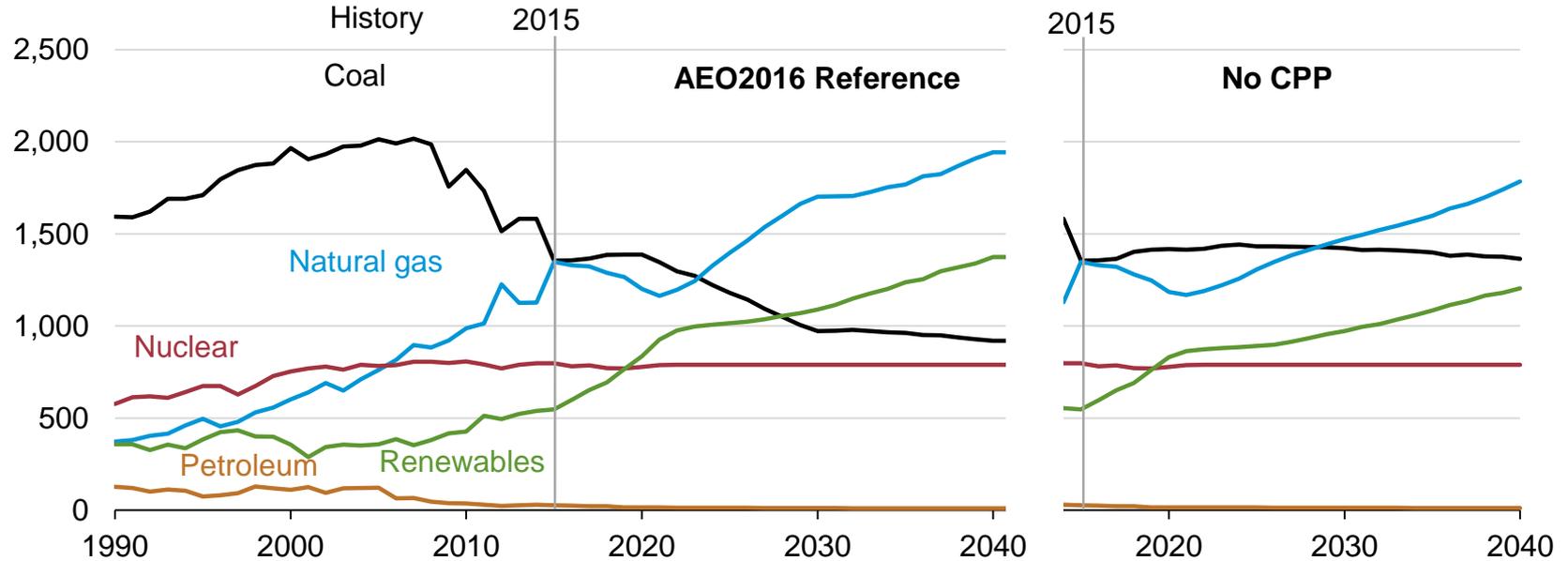
AEO2016 Reference



Source: EIA, Annual Energy Outlook 2016

Natural gas generation falls through 2021; both gas and renewable generation surpass coal by 2030 in the Reference case, but only natural gas does so without the Clean Power Plan

net electricity generation
billion kilowatthours

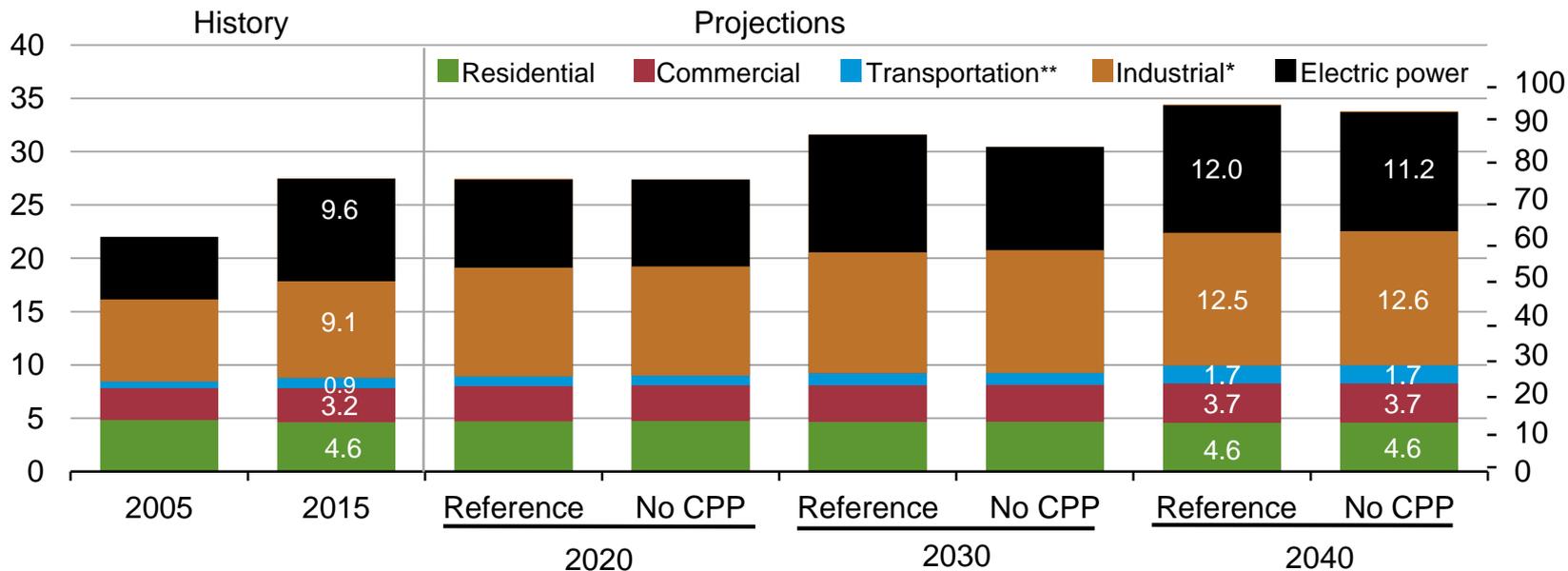


Source: EIA, Annual Energy Outlook 2016

Natural gas consumption growth is led by electricity generation and industrial uses; natural gas use rises in all sectors except residential

U.S. dry gas consumption
trillion cubic feet

billion cubic feet per day



Source: EIA, Annual Energy Outlook 2016

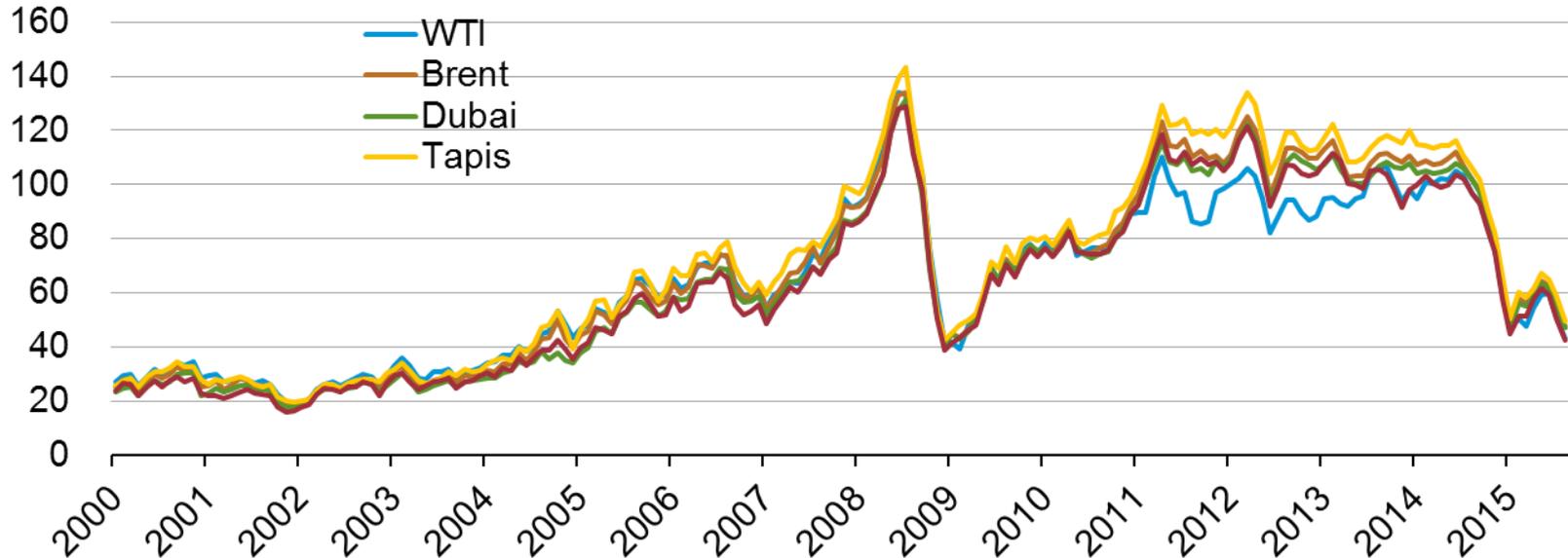
*Includes combined heat-and-power and lease, plant, and export liquefaction fuel

**Includes pipeline fuel

World oil prices move together due to arbitrage

Global crude oil prices

Nominal dollars per barrel, monthly average

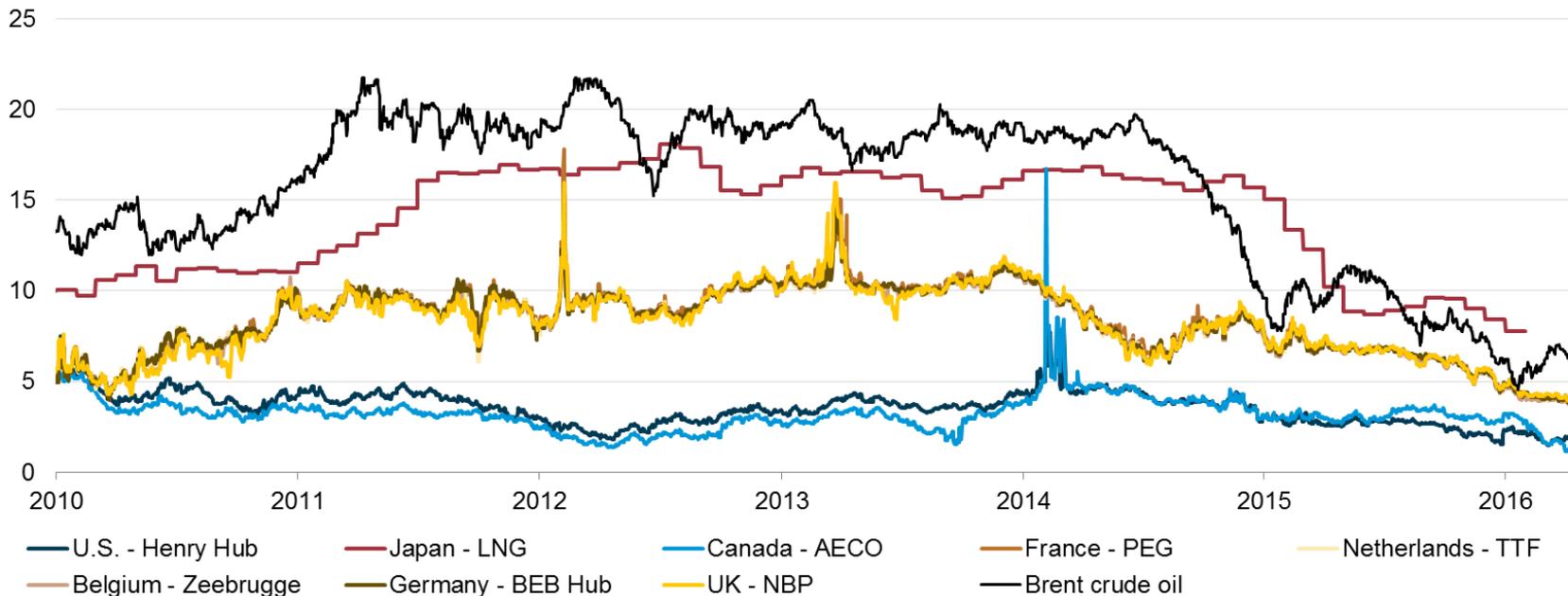


Sources: Bloomberg, Thomson Reuters

North American natural gas prices are low compared to prices in the rest of the world, although spreads have narrowed recently

select global natural gas and crude oil prices with average monthly LNG prices in Japan

U.S. dollars per million British thermal unit



Source: EIA, Bloomberg L.P.

Global Energy Outlook

Key findings in the IEO2016 Reference case

- World energy consumption increases 48% increase (1.4% compound annual growth rate) between 2012 and 2040. Non-OECD Asia (including China and India) account for more than half of the increase.
- The industrial sector continues to account for the largest share of delivered energy consumption; the world industrial sector still consumes over half of global delivered energy in 2040.
- Renewable energy is the world's fastest-growing energy source, increasing by 2.6%/year; nuclear energy grows by 2.3%/year, from 4% of the global total in 2012 to 6% in 2040.
- Fossil fuels continue to supply more than three-fourths of world energy use in 2040.

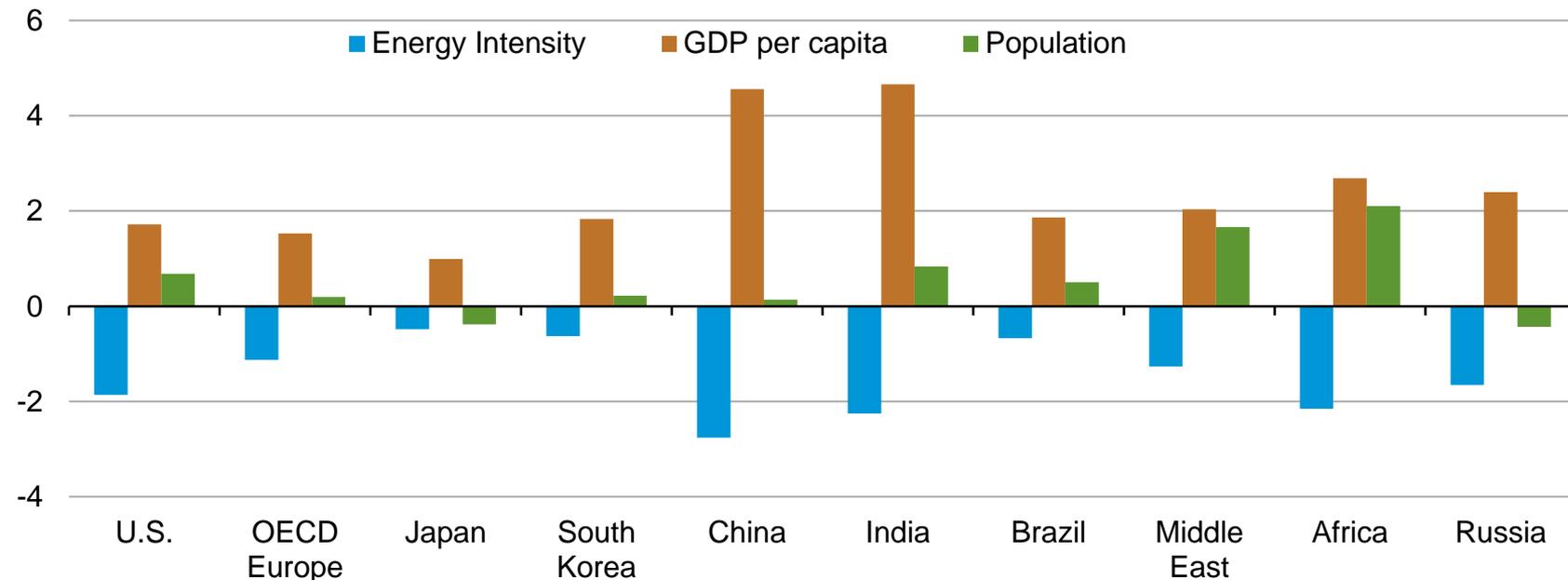
Many global issues increase uncertainty...

- Economic growth in key economies (China, Brazil, Russia, among others)
- Implementation and strength of climate policies
- Technology improvement rates (both supply and demand)
- Unrest in oil producing countries
- OPEC production
- Future of nuclear generating capacity

Economic activity and population drive increases in energy use; energy intensity (E/GDP) improvements moderate this trend

average annual percent change (2012–40)

percent per year

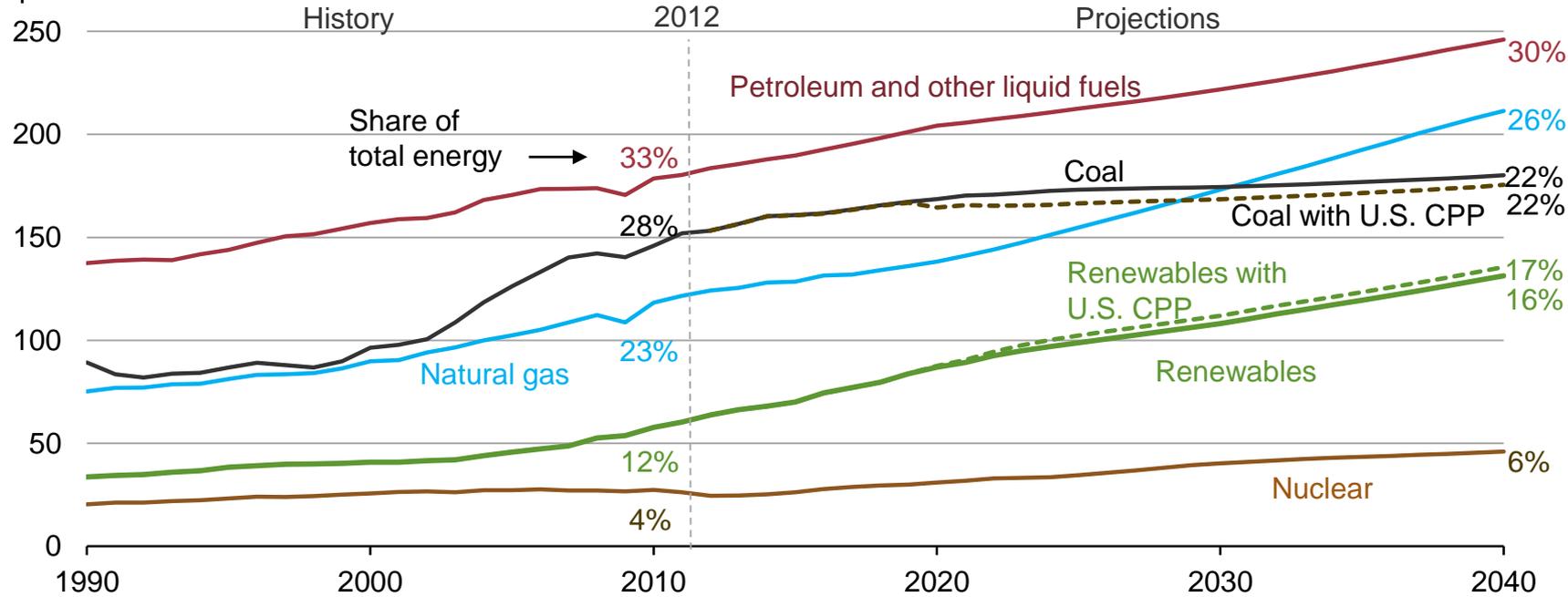


Source: EIA, *International Energy Outlook 2016*

Renewables grow fastest, coal use plateaus, natural gas surpasses coal by 2030, and oil maintains its leading share

world energy consumption

quadrillion Btu

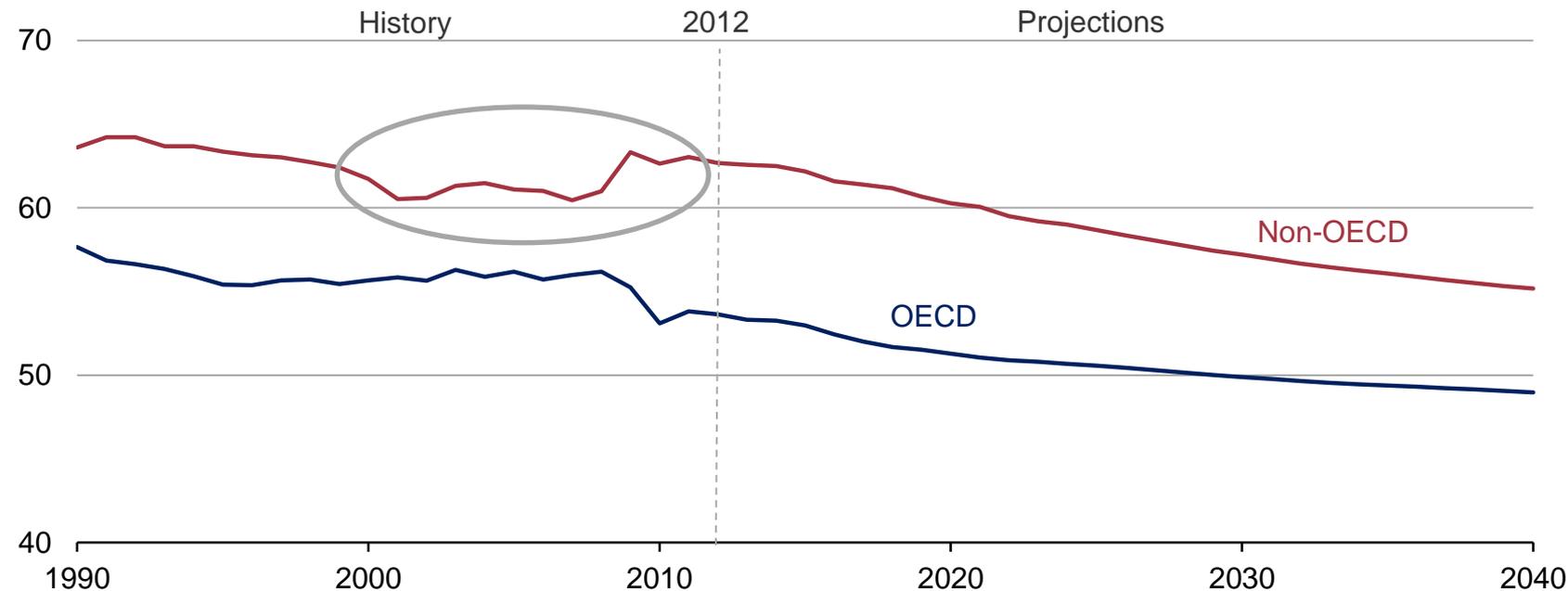


Source: EIA, International Energy Outlook 2016 and EIA, Analysis of the Impacts of the Clean Power Plan (May 2015)

Projected carbon intensity of energy use (CO₂/E) declines through 2040 in both OECD and non-OECD; non-OECD CO₂/E rose over 2000–12

carbon intensity of energy consumption, 1990-2040

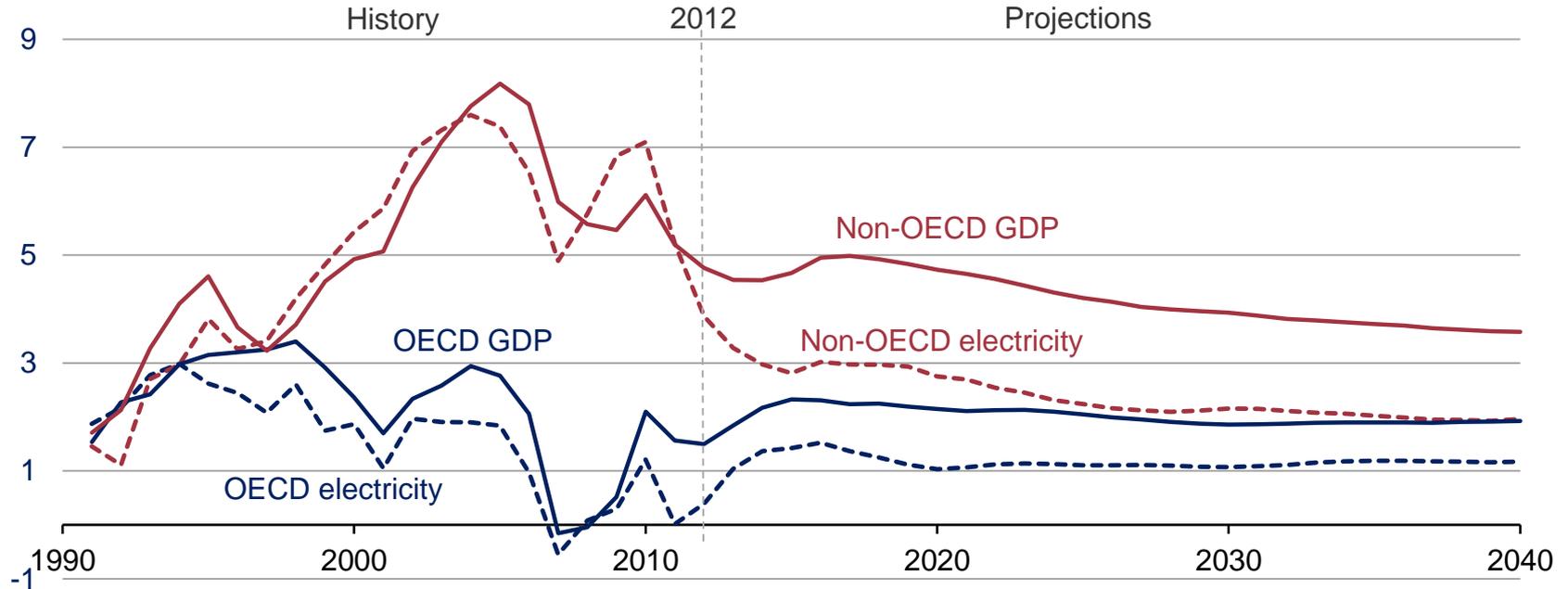
kilograms CO₂ per million Btu



Source: EIA, *International Energy Outlook 2016*

GDP drives electricity demand growth, but the electricity growth rate compared to the GDP growth rate becomes smaller over time

world GDP and net electricity generation
percent growth (rolling average of 3-year periods)

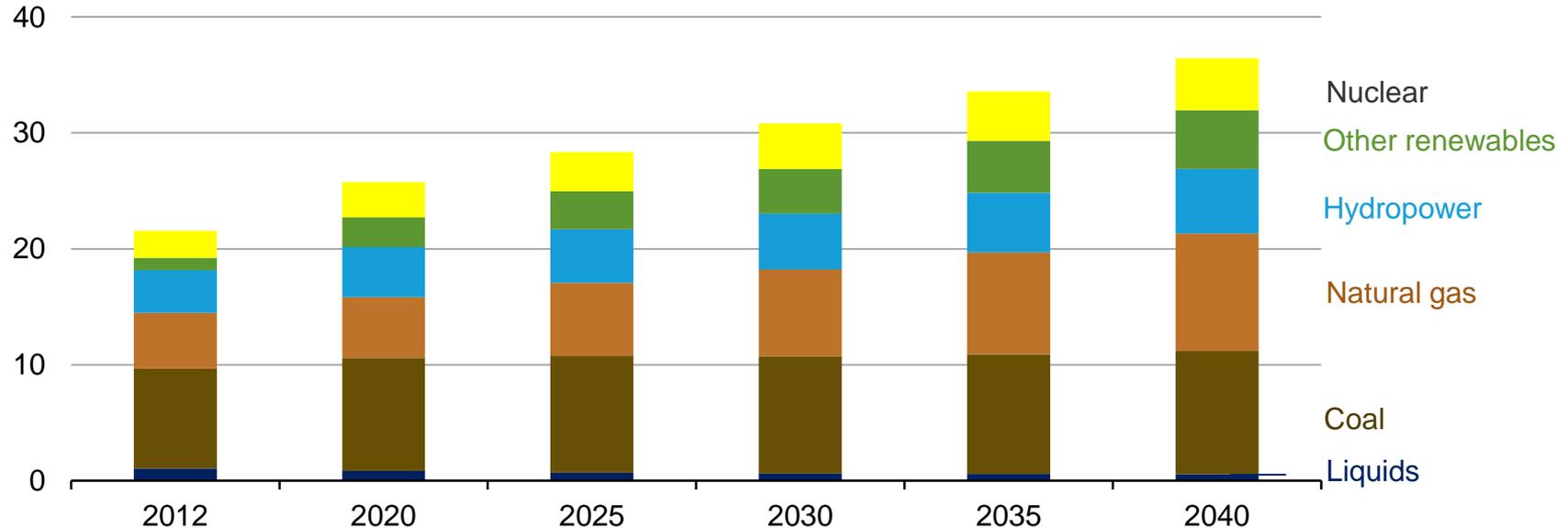


Source: EIA, International Energy Outlook 2016

Renewables, natural gas, and coal all contribute roughly the same amount of global net electricity generation in 2040

world net electricity generation by source

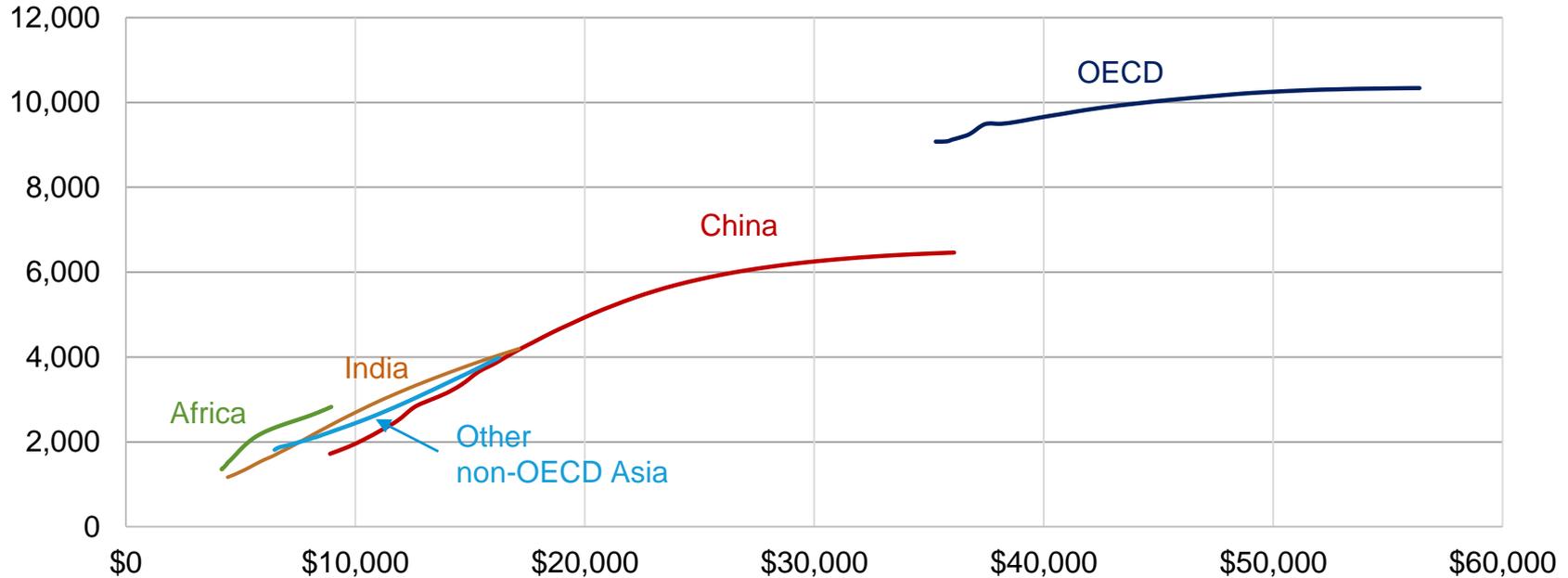
trillion kilowatthours



Source: EIA, International Energy Outlook 2016

Passenger-miles per person will rise as GDP per capita grows; travel growth is largely outside the OECD

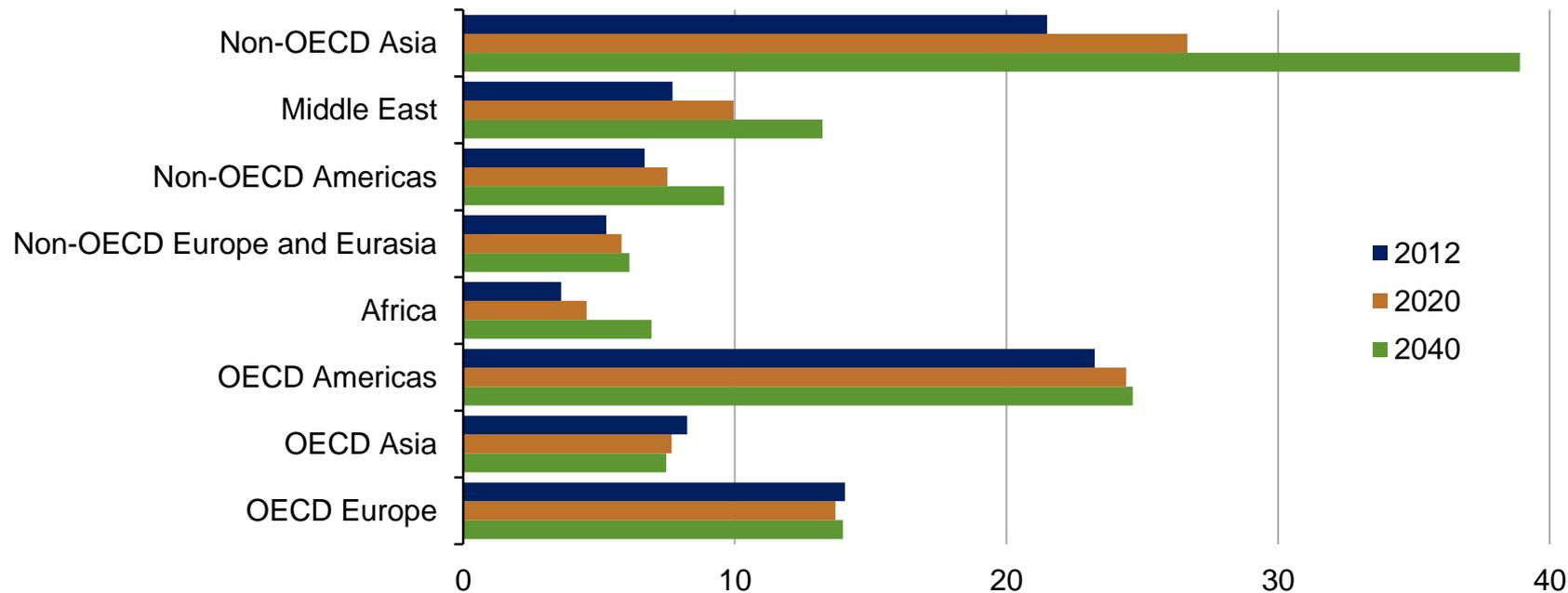
passenger-miles per capita (left-axis) and GDP per capita (horizontal-axis) for selected country groupings 2010–40



Source: EIA, *International Energy Outlook 2016*

Most of the growth in world oil consumption occurs in the non-OECD regions — especially Asia

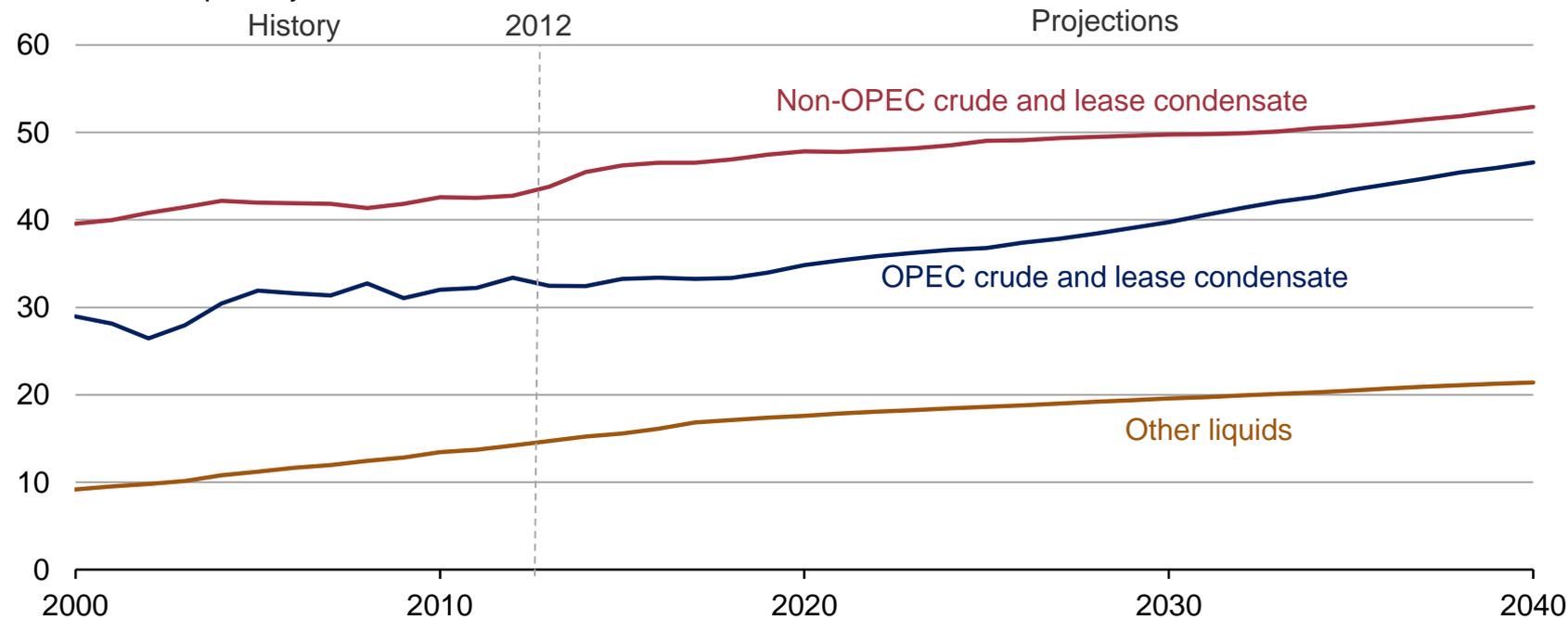
world petroleum and other liquid fuels consumption
million barrels per day



Source: EIA, *International Energy Outlook 2016*

Liquid fuels supplies from both OPEC and non-OPEC producers increase through 2040

world production of petroleum and other liquid fuels
million barrels per day



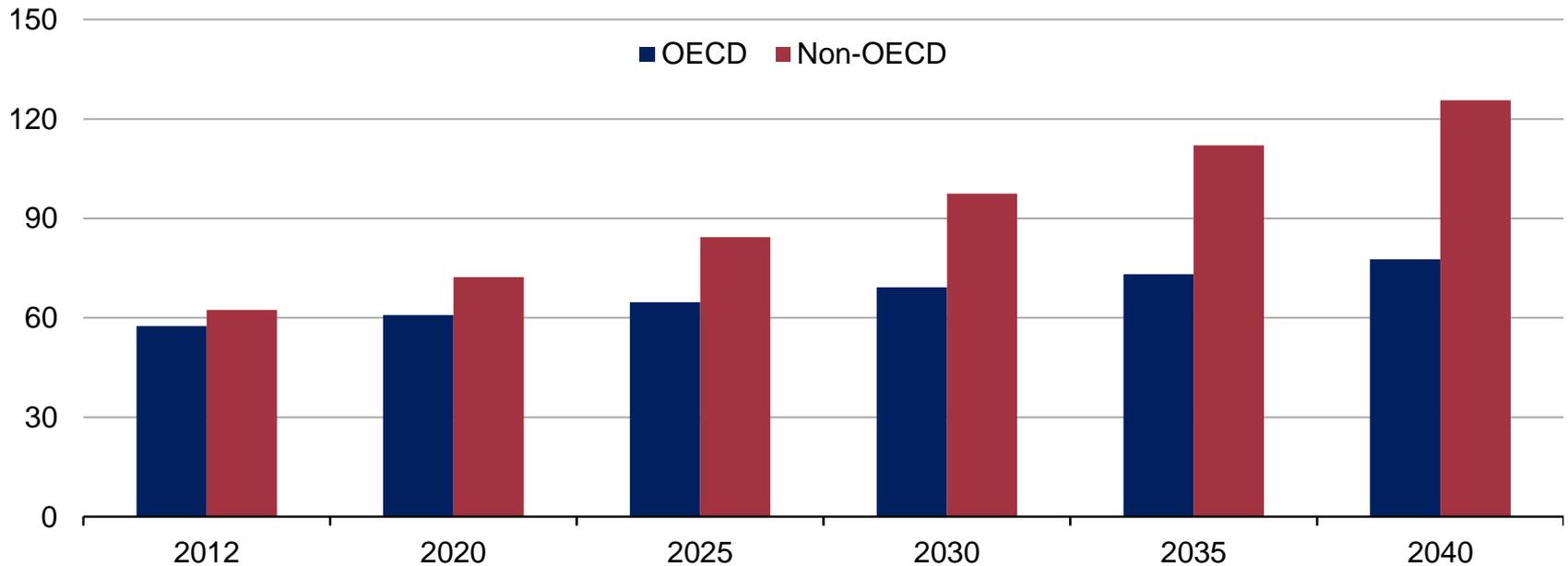
Source: Current thinking

LONGER TERM PERSPECTIVE: Can OPEC cohere? – Change in world liquid fuel balances for two 12-year historical periods with EIA projections for 2013-25 (million barrels per day)

	Actual		Current Thinking
	1973–85	2000–12	2013–25
World Liquids Demand	+3	+12	+9 to +13
OECD	-4	-2	-2 to 0
Non-OECD	+7	+15	+11 to +13
World Liquids Supply	-1	+12	+9 to +13
Non-OPEC Supply	+13	+6	+9 to +12
OPEC Production	-14	+6	-3 to +4

Non-OECD nations account for ¾ of projected growth in natural gas consumption

world natural gas consumption
trillion cubic feet

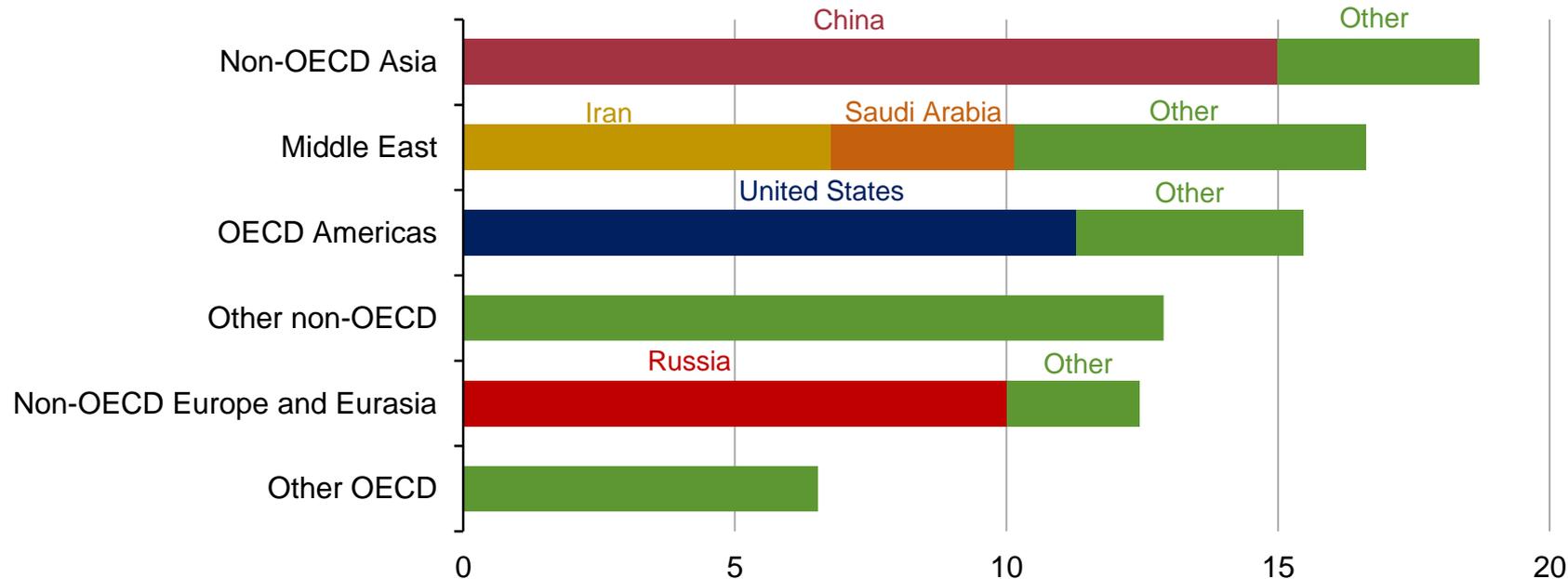


Source: *Current Thinking*

Non-OECD Asia, Middle East, and OECD Americas account for the largest increases in natural gas production

world change in natural gas production, 2012–40

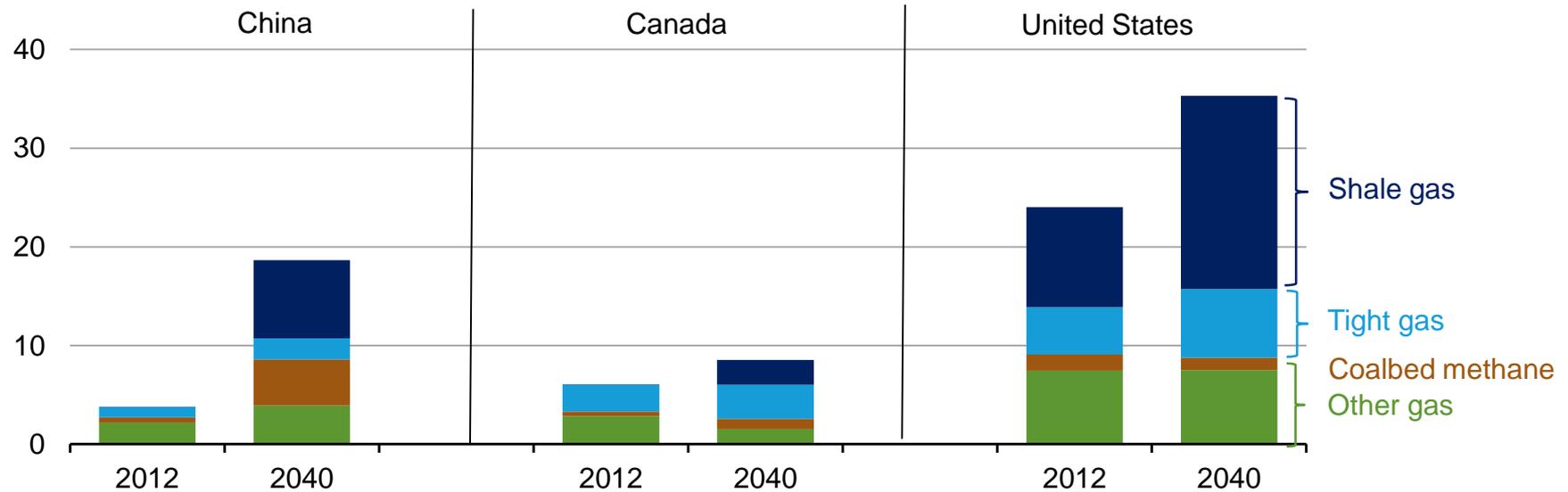
trillion cubic feet



Source: EIA, *International Energy Outlook 2016*

Shale gas, tight gas, and coalbed methane become increasingly important to gas supplies, not only for the U.S., but also China and Canada

natural gas production by type
trillion cubic feet



Note: Other natural gas includes natural gas produced from structural and stratigraphic traps (e.g. reservoirs), historically referred to as 'conventional' production.

Source: Current thinking

For more information

U.S. Energy Information Administration home page | www.eia.gov

Annual Energy Outlook | www.eia.gov/aeo

Short-Term Energy Outlook | www.eia.gov/steo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

Today in Energy | www.eia.gov/todayinenergy

International Energy Portal | www.eia.gov/beta/international/?src=home-b1